

## Improvement of Design Experience

The EE program gives a high degree of importance to continuous improvement in design experience of all graduates. Recent actions in this regard include:

- I. The program updated the academic plan, including the introduction of the preparatory PY year in academic year 2008 to enhance the skills of students. The current plan supports design concepts in different levels.
- II. General engineering courses include a new course GE 105 Introduction to Engineering Design to introduce the concepts of design to students.
- III. Electrical engineering courses include various courses at 200 and 300 level to address outcome (C) related to design. Elective courses of 400 level give students opportunity to practice design experience in class projects and assignments.

Details of how some of these courses are addressed in Criterion 5.

- IV. The summer training program has been improved leading to a new course of 1 credit (with no-grade). The course is renamed to Practical Training. Efforts are made to get all students the experience to have practical training within advanced companies that can provide design practice to students.
- V. New courses EE 496 and EE 497 of graduation projects ensure that all students should conduct a design project. A template is introduced to EE 497 students to make sure that students cover various design aspects in their report. Assessment forms of EE 496 and EE 497 are updates to make sure the students are evaluated related to design aspects.

Details are given in Criterion 5.

- VI. A committee has been formed in the college in 2011 in the college of engineering to update the capstone design project courses.

Due to the importance of the graduation project as a culminating experience for the senior engineering students, the Dean of the College of Engineering, Dr. Khalid Alhemaizy, assembled a Task Force and charged it, on January 2011, to put together a Guide including recommendations for conducting the design projects. Specifically, the Task Force considered the following graduation project issues:

1. Teaming: Number of students; Selection of team members; Selection of project topic
2. Advising: Number of advisors; Role of the advisor; Advising load
3. Project topics: Faculty members against student team proposals

4. Scheduling and Announcing: Assignment of the project topic; First semester presentation and report; Second semester presentation and report; Poster day
5. Course conduct: Meeting with the advisors; Team meetings; Project progress evaluation; Lectures
2. Course materials
3. Financing of the projects: Prototyping; Plant/industry visit
4. Project evaluation: Evaluation forms for oral presentation, report writing, prototyping, and poster; Design panel (examiners/evaluators)
5. Other issues for improving the graduation project

The Task Force Members are:

**Supervising Committee**

Dr. Khalid I. Alhemaizy	(CoE Dean- Chair)
Dr. Khalid Alsalem	(CoE Vice Dean- Member)

**Principal Committee**

Dr. Mohamed M. ElMadany	(ME-Coordinator)
Dr. Abdulrahman AlSahaibany	(CE-Member)
Dr. Murad BoMeza	(CHE-Member)
Dr. Mosaad A. Foda	(ME-Member)
Dr. Abdulfattah Sheta	(EE-Member)
Dr. Ahmed M. El-Sherbeeny	(IE-Member)
Eng. Abdulbari Al-Arif	(PE-Member)

A graduation project guide report, in Appendix E-2-1, is produced by the committee by the end of 2011.

- VII. A committee has been formed in the EE department to update the general requirements of the final report of the graduation project. Various evaluation forms for evaluating graduation project 1 and 2 are also designed to cover all the ABET requirements. The evaluation forms are given in Appendix E-2-2. A template for EE 497 report is set (Appendix E-2-3). The EE department committee members are:

Dr. Abdel Fattah Sheta	Coordinator
Dr. Adnan Nouh	Member
Dr. Saad Alghwanam	Member
Dr. Mohammed Altairagi	Member

This committee also supervises the graduation project competition organized by the college of Engineering.

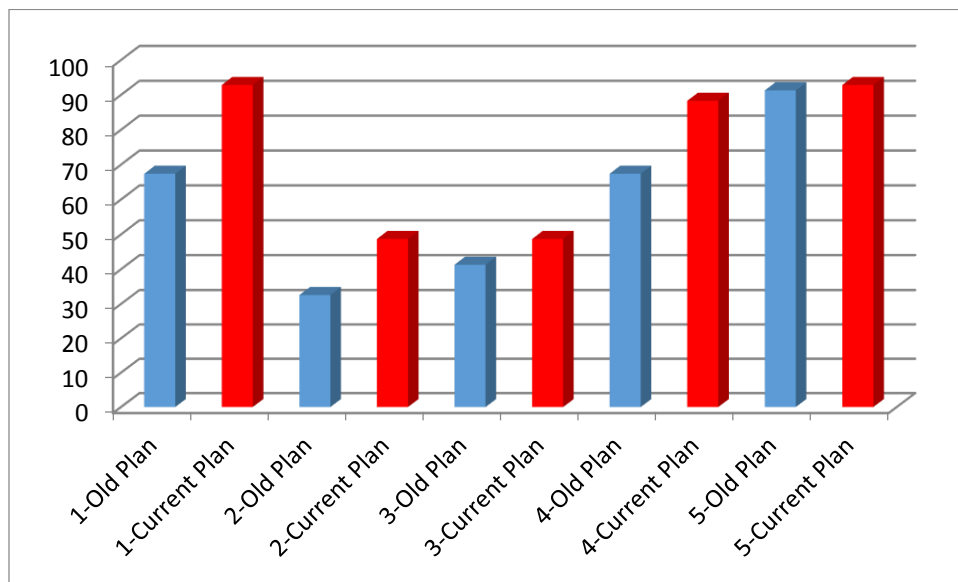
VIII. A committee has been formed in 2015 to analyze the progress in capstone design projects based on design aspects. The committee based the analysis on direct assessment and indirect assessment.

**Direct Assessment:**

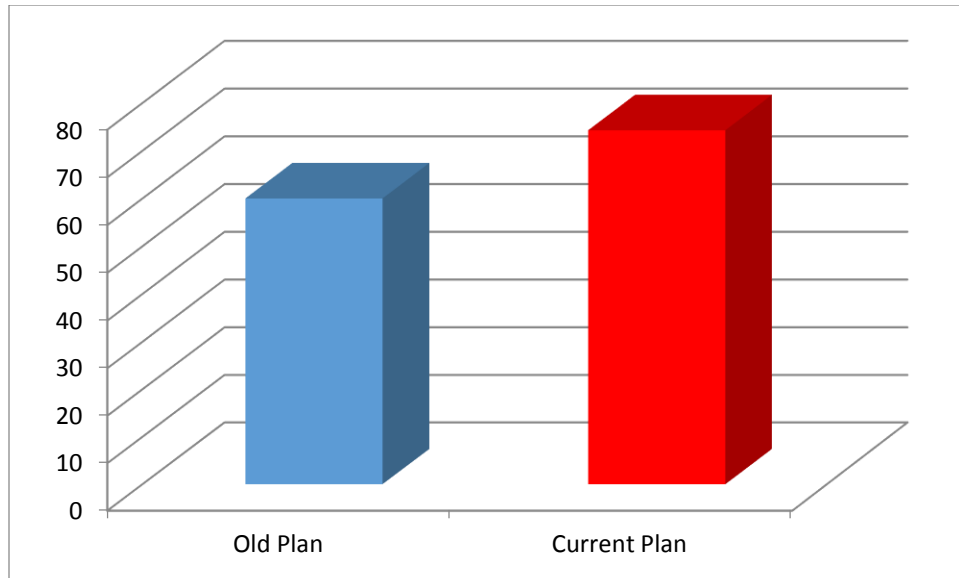
In the direct assessment, the committee chose randomly 20 samples of graduation project-2 final report before 2009. Other 20 report samples were chosen of recent reports. Each report was analyzed by at least two faculty members. The questions of comparison required to state if :

1. The report Includes objectives and problem formulation
2. The report Includes design constraints and specification.
3. The report presents various approaches (alternative solutions).
4. The student uses modern engineering tools.
5. The report includes illustration of the adopted solution and results.

A scale of assessment level from 0 to 100 has been made bases on the results. Fig. 4-17 presents comparison of each of the 5 comparison questions for reports in the new plan and current plan. Overall comparison is given in Fig. 4-18.



**Fig. 4.17: Compariosn of capstone design projects in the old and current plan considering the five points of design aspects.**



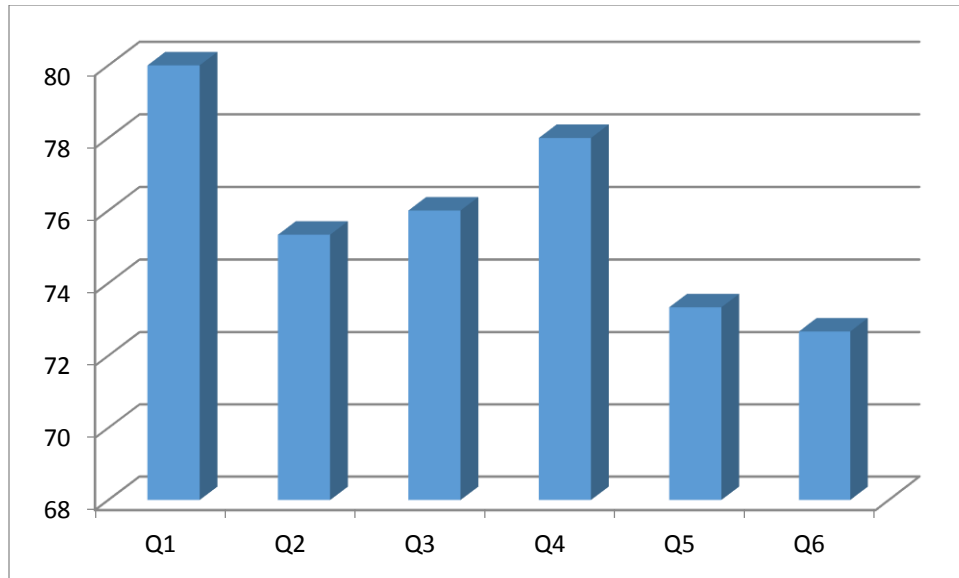
**Fig. 4.18: Overall comparision of capstone design projects in the old and current plan considering the five points of design aspects.**

### ***Indirect Assessment***

A survey has been conducted with the EE faculty. The Survey questions were:

1. **General engineering** (GE) courses including GE 105 (*Introduction to Engineering Design*) introduce the concept of design efficiently.
2. Design concepts provided in EE **core courses** dealing with outcome (c) are satisfactory.
3. EE **elective courses** provide adequate practice in conducting design.
4. Students are well prepared for capstone design project in current **EE Plan** compared to previous plans.
5. Students follow ABET **design requirements** in the capstone senior design project.
6. EE 497 reports reflect that students are equipped with a major **design experience**.

Survey results of each of the six questions is shown in Fig. 4.19.



**Fig. 4.19: Faculty survey results of the six questions given above related to design experience.**

#### Conclusions and Remarks:

From the analysis direct and indirect assessment, we conclude that there is a considerable improvement in the design experience of EEP students. The program took a major step in improving the design experience of students as a motivation of updating the current plan. Starting from 2012, a plan update was discussed. The main concern of the current plan is that students start the graduation project in the 9th level, when they also start choosing the elective courses. In the new plan which has been approved by the department and college, students will start to take elective courses in the 8th level. The students will start to formulate the graduation project topic in the 7th level. They can thus direct their elective courses to help them in their work of the capstone design project.